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Threshold correction of regional climate model ensembles for climate extreme assessments on the country level

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Raw data of regional climate model (RCM) simulations within Euro-Cordex have bias against observed temperature and total precipitation for the historical period. This leads to an over/under estimation of especially threshold-based climatic indices, such as the number of hot days (tx>30°C) or the number of days with heavy precipitation (pr>30mm), respectively. Commonly used bias-correction approaches use a trend-preserving quantile mapping to adjust the raw model data to daily observations. However, the spatial quality strongly depends on the model performance and the used reference data such as E-OBS for whole Europe. For climate extreme assessments on the country level large differences occur in comparison to other meteorological datasets provided by national weather services.

Within the ReKliEs-De project an extended Euro-Cordex ensemble will be generated and analyzed for Germany and including river catchments flow into related to the model performances and spatial distributions of the numbers of days with extreme weather: heat and heavy rain. Existing biases in the raw model data are only adjusted by using a space-time percentile correction approach for the threshold tx>30°C and pr>30mm. Thereby, every GCM-RCM combination is associated to a specific threshold.

The results reveal a much better representation of the climate sensitivity of extreme weather days in comparison to results provided by other sophisticated bias correction approaches using E-OBS. Especially, national precipitation datasets are much closer to the real world than roughly gridded datasets. The ensemble analysis reveals a measurable increase of both number of hot days and days with heavy rain until 2041-2070 under the RCP8.5 emission scenario.